FACTSHEET
ISSN 1198-712X ©Queen's Printer for Ontario
Agdex#: 440/50 Publication Date: 02/01
Order#: 01-013 Last Reviewed: 02/01

Title: Practical Diets for Pigs

Division: ARD

History:

Written by: D. J. Peer, R. Ball, L. Young

Table of Contents:

1. Introduction
2. Definitions of Nutritional Terms
3. Samples of Practical Diets
4. Table 1. Conversion Equations
5. Table 2. Practical Starter (10-20 kg live weight) Diets
6. Table 3. Practical Grower (20-50 kg) Diets
7. Table 4. Practical Finisher (50 - 100 kg) Diets
8. Table 5. Practical Sow Diets
9. Compositions of Premixes and Supplements used Here
10. Table 6. Composition of Premixes and Supplements Unsed in this Factsheet (dry matter basis)

Introduction

This Factsheet suggests some simple, but adequate diets for pigs that can be made easily and economically on the farm.

Included in the Factsheet are: definitions of nutritional terms; a conversion table; samples of practical diets for starting, growing, finishing pigs and dry and nursing sows; and a table showing the nutrient levels of premixes and supplements used in this Factsheet.

Digestible energy values are given in both megajoules and megacalories, and the nutrient analyses of the sample diets are quoted on a dry matter basis (see Samples of Practical Diets).

| Top of Page |

Definitions of Nutritional Terms

· Good pig performance means the pigs are gaining and converting feed to gain at rates similar to those quoted in OMAFRA Factsheet Nutrient Recommendations for Pigs on an As Fed and Dry Matter Basis, Order No. 87-076.

· Superior pig performance means that the pigs are gaining and converting feed to gain at a 10% greater rate than pigs in the "good" group (see Factsheet 87-076 as above).

· Diet means the ingredient composition of a complete feed; ration is the amount of feed consumed in a 24-hour period.

· Balanced diet is a diet that contains feed ingredients in a combination that will supply nutrients in the proper amounts required by the animal.

· Nutrient density is the concentration of nutrients in a given amount of feed. For example, a starter diet containing 20% crude protein, 1.0% calcium, and 0.85% phosphorus is more nutrient dense than a finisher diet containing 16% crude protein, 0.69% calcium and 0.63% phosphorus.

· Calcium:Phosphorus ratio (Ca:P) is the ratio of the amount of calcium to the amount of phosphorus. The tolerance range for pigs is 1.1-2 Ca:1 P. The optimum is about 1.2 Ca:1 P as this is the ratio of Ca:P found in pig bones. Ratios outside the tolerance range can lead to leg problems, especially ratios greater than 3:1 (Ca:P). The ratio is less critical when both calcium and phosphorus are above the minimum requirement level.

· Nutrient to digestible energy ratio is the ratio of the amount of nutrients to the amount of digestible energy in the diet. Pigs eat to meet their energy requirement, so the energy concentration of the diet greatly influences the amount of feed a pig will eat; therefore, lysine and other nutrients should be in proportion to the digestible energy in order for the pig to meet its daily nutrient requirement. A high energy diet should have a high concentration of other nutrients, while a lower energy diet could have a reduced concentration of nutrients; but it is impractical in some cases, to lower the concentration of some nutrients, even when the energy concentration of the diet is low.

· Palatability is the term used to describe the extent to which a pig likes to eat a given feed ingredient or diet. Soybean meal is a very palatable feed ingredient, while canola meal is less palatable.

| Top of Page |

Samples of Practical Diets

All the sample diets have the calculated nutrient analyses quoted on a dry matter basis only; the amounts of feed ingredients used are given on an as fed basis. Expected daily feed intake and feed conversions are given on both bases. Digestible energy concentration of the diets are quoted in both megajoules and megacalories.

Expected feed intakes and feed conversions were calculated using the daily energy requirement of the different weights of pigs, assuming optimal barn temperature and good management. Cold barns, disease, poor ventilation and poor management all affect feed intake and feed efficiency. Therefore, your pigs may not eat the same level of feed or have the same feed efficiencies as shown in this Factsheet.

The sample diets were balanced for lysine, instead of crude protein, because lysine is usually the first limiting amino acid in the protein of pig diets. Some grains (especially wheat) are higher than corn in crude protein content, but are lower in lysine content; therefore, the crude protein level of some grain diets must be higher in order to meet the requirement for lysine.

101-05309/

A vitamin-mineral premix or supplement is a package of nutrients in a fixed concentration. They are often formulated to be added to corn-soybean meal diets. Other feed ingredients differ from corn and soybean meal in their concentration of nutrients, so the use of one vitamin-mineral premix or supplement for many different diets can cause overfeeding of some nutrients.

TABLE 1. Conversion Equations

Unit Given	Unit Wanted	Conversion Equation
As Fed (AF)	Dry Matter (DM)	$AF + \frac{(\%DM)}{100} = DM$
Dry Matter (DM)	As Fed (AF)	$DM \times \frac{(\%DM)}{100} = AF$
Megajoule (MJ)	Kilojoule (KJ)	MJ x I000 = KJ
Megacalorie (Mcal)	Kilocalorie (Kcal)	Mcal x 1000 = Kcal
Joules (J)	Calories (Cal)	J x 0.239 = Cal
Calories (Cal)	Joules (J)	Cal x 4.186 = J

For example, in a diet containing 88% DM and 15% crude protein (as fed), the protein content, on a dry basis, is

$$15 + \frac{88}{100} = 17.0\%$$

It is impractical to have many different premixes or supplements for many different types of diets on the same farm. The diets in this Factsheet are designed to be practical and ready for use on the farm. Therefore, 1 vitamin-mineral premix and supplement was used for the grower and finisher diets, 1 premix and supplement for both dry and nursing sow diets, and 2 supplements (one with and one without milk products) were used for the starter diets.

Note that some of the diets have higher levels of nutrients than recommended in OMAFRA Factsheet Order No. 87-076 (e.g. lysine content of starter diet #2 in Table 2). And some of the low energy diets have nutrients at the same level as the higher energy diets, regardless of the ratio of energy to nutrients. Feeding levels of nutrients slightly higher than needed, is far better than feeding too little.

Pigs are very limited in their ability to digest fibre. The higher fibre lowers the digestible energy content of the diet and increases the feed required per unit of gain (see feed conversions, dry matter basis, of finisher diets #1 and 5, Table 4). If the digestible energy content of the diet is too low, the pig may not be able to consume

enough feed to meet its energy requirement and grow rapidly; therefore, diets for young pigs should be high in energy and low in fibre. Finishing pigs and dry sows may tolerate more fibre.

| Top of Page |

Creep and Starter Diets

Creep diets (Table 2) are designed to be fed to suckling pigs from about 7 or 14 days of age (depending on the diet) to weaning. They are high in nutrient density and palatability, and very low in fibre content.

Starter diets (Table 2) are also high in nutrient density and palatability, and low in fibre. They can contain high levels of milk products for early weaning. Starter diets can also be used as creep diets while the pigs are suckling.

TABLE 2. Practical Starter (10–20 Kg live weight) Diets

expected daily gain = 450 g

	DIET #						
	1	2	3	4	5	6	7
FEED INGREDIENTS (As fed basis)							
GRAINS, kg							
Corn (15% moisture)	585	650	651			456	465
Corn (28% moisture)				700	528		
Barley (Ont.)					200		
Wheat (Ont. winter)						220	
Oats (Tibor, hulless)							250
SUPPLEMENTS kg							
Soybean Meal (44%)						290	
Soybean Meal (48%)	230		114		240		250
Soybean (rst/ext)[1]			200				
Whey (dehydrated)	150						
Starter Supplement[2]		350					

38%							
Pig Supplement[3] 38%				300			
Starter premix	35		35[4]		32	34	35
TOTAL (kg)	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**
CALCULATED ANALYSIS (Dry matter basis)							
Dry Matter (DM), %	88.68	87.80	88.00	81.60	83.58	88.15	88.63
Energy (DE)[5] MJ/kg	16.24	16.59	16.95	16.68	16.15	16.06	16.71
Mcal/kg	3.88	3.96	4.05	3.99	3.86	3.84	3.99
Crude Protein (CP), %	20.34	20.86	21.11	20.43	21.26	21.44	21.64
Lysine (Lys), %	1.14	1.46	1.14	1.16	1.11	1.11	1.14
Crude fibre (CF), %	2.55	2.20	3.43	2.92	3.45	3.93	3.09
Calcium (Ca), %	1.01	0.91	0.91	0.89	0.87	0.90	0.90
Phosphorus (P), %	0.85	0.80	0.80	0.82	0.79	0.79	0.81
Selenium (Se), Mg/kg	0.45	0.44	0.46	0.40	0.47	0.52	0.44
Vitamin E, IU/kg	18.90	17.93	44.30	17.54	18.38	18.51	23.02
Ca:P ratio	1.2:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
EXPECTED FEED INTAKE (kg/pig/day)							
As Fed	0.94	0.93	0.91	0.99	1.00	0.95	0.91
Dry	0.83	0.82	0.80	0.81	0.84	0.84	0.81
EXPECTED FEED CONVERSION (Feed intake/gain)							
As Fed	2.09	2.07	2.02	2.20	2.22	2.11	2.02
Dry	1.84	1.82	1.78	1.80	1.87	1.87	1.80

[1] Roasted/extruded soybeans

[2] Starter supplement with milk products

[3] Pig supplement without milk products

[4] Increased vitamin E levels for this diet

[5] DE = digestible energy

| Top of Page |

Grower Diets

Grower diets (Table 3) are less nutrient dense (except for energy) than starter diets because growing pigs (20-50 kg) are larger and are able to consume a greater amount of feed.

Grains to use in grower diets are corn (dry and high moisture), barley, and wheat. They contain good amounts of digestible energy. The digestible energy content of oats and mixed grain however, is lower, and may result in slower growth.

Grower diets #1-6 meet the recommended nutrient levels for good pig performance and diet #7 meets the recommendations for superior pig performance. Note that although the lysine level of diet #4 is lower than diet #2 on a percentage basis, both diets supply approximately the same grams of lysine on a daily basis.

· Diet #2 - 0.92% lysine x 1.61 kg dry matter/day = 14.8 g lysine/day
· Diet #4 - 0.78% lysine x 1.91 kg dry matter/day = 14.9 g lysine/day).

Grower diets can also be fed through the finisher period if non-medicated.

TABLE 3. Practical Grower (20–50 kg) Diets

expected daily gain =	700 g						800 g
	DIET #						
	1	2	3	4	5	6	7
FEED INGREDIENTS (As fed basis)							
GRAINS, kg							
Corn (15% moisture)		775	743		530		737
Corn (28% moisture)	783						
Barley (Ont.)				830	250	280	
Wheat (white winter)						512	
SUPPLEMENTS, kg							
Soybean meal (44%)				145		180	
Soybean meal (48%)	190		125				225
*Soybeans (rst/ext)			100				

Hog Supplement (42%)		225			220		
Hog premix	27		32	25		28	38
TOTAL (kg)	1000	1000	1000	1000	1000	1000	1000
CALCULATED ANALYSIS (Dry matter basis)							
Dry Matter (DM), %	80.77	87.67	87.81	88.88	88.15	89.10	87.73
**Energy (DE) MJ/kg	16.78	16.78	16.78	14.17	16.09	15.59	16.63
Mcal/kg	4.01	4.01	4.01	3.39	3.84	3.72	3.97
Crude Protein (CP), %	18.66	18.38	18.27	17.39	18.80	18.17	19.48
Lysine (Lys), %	0.93	0.92	0.93	0.78	0.93	0.85	1.00
Crude fibre (CF), %	2.75	2.95	3.78	5.73	3.65	4.18	2.96
Calcium (Ca), %	0.82	0.83	0.89	0.82	0.83	0.81	1.04
Phosphorus (P), %	0.71	0.71	0.73	0.71	0.73	0.73	0.80
Selenium (Se), mg/kg	0.22	0.21	0.26	0.28	0.20	0.28	0.30
Vitamin E, IU/kg	21.41	18.74	30.00	18.01	18.23	20.12	28.43
Ca:P ratio	1.2:1	1.2:1	1.2:1	1.2:1	1.1:1	1.1:1	1.3:1
FEED INTAKE (kg/pig/day)							
As Fed	1.99	1.84	1.83	2.14	1.91	1.95	1.85
Dry	1.61	1.61	1.61	1.91	1.68	1.74	1.63
FEED CONVERSION (Feed intake/gain)							
As Fed	2.84	2.63	2.61	3.06	2.73	2.79	2.31
Dry	2.31	2.31	2.30	2.73	2.40	2.49	2.04
*roasted/extruded soybeans **DE = digestible energy							

| Top of Page |

Finisher Diets

Finisher diets (Table 4) are less nutrient dense (except for energy) than grower diets because finishing pigs (50-100 kg) are larger and are able to consume a greater amount of feed.

Grains recommended for grower diets can also be used in finisher diets. In addition,

mixed grain may be fed; however, some decrease in growth rate may occur. Finisher diets #1-6 meet the recommended nutrient levels for good pig performance and diet #7 meets the recommended nutrient levels for superior pig performance. Similar to the grower diets, finisher diets that are lower in digestible energy may also have a lower concentration of nutrients.

TABLE 4. Practical Finisher (50–100 Kg) Diets							
expected daily gain =	820 g						900 g
	DIET #						
	1	2	3	4	5+	6	7
FEED INGREDIENTS (As fed basis)							
GRAINS, kg							
Corn (15% moisture)	829	800					800
Corn (28% moisture)			836	556			
Barley (Ont.)				260		886	
Mixed Grain (Ont.)					895		
SUPPLEMENTS, kg							
Soybean meal (44%)					84	92	
Soybean meal (48%)	146		140	60			170
*Soybeans (rst/ext)				100			
Hog Supplement (40%)		200					
Hog premix	25		24	24	21	22	30
TOTAL (kg)	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**
CALCULATED ANALYSIS (Dry matter basis)							
Dry Matter (DM), %	87.34	87.37	80.11	83.26	87.39	88.84	87.47
**Energy (DE) MJ/kg	16.81	16.59	16.79	16.09	13.45	14.16	16.73

Mcal/kg	4.02	3.96	4.01	3.84	3.21	3.38	4.00
Crude Protein (CF), %	16.05	16.89	16.28	16.39	15.22	15.43	17.08
Lysine (Lys), %	0.74	0.79	0.76	0.76	0.62	0.64	0.83
Crude fibre (CF), %	2.94	3.47	2.70	3.78	8.49	5.68	2.95
Calcium (Ca), %	0.69	0.71	0.74	0.72	0.71	0.72	0.82
Phosphorus (P), %	0.63	0.62	0.65	0.67	0.65	0.66	0.69
Selenium (Se), Mg/kg	0.22	0.18	0.22	0.23	0.25	0.26	0.25
Vitamin E, IU/kg	18.33	17.59	19.19	30.00	15.39	15.86	21.96
Ca:P ratio	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1	1.2:1
FEED INTAKE (kg/pig/day)							
As Fed	3.01	3.06	3.29	3.31	3.77	3.52	3.02
Dry	2.63	2.67	2.64	2.75	3.29	3.13	2.64
FEED CONVERSION (Feed intake/gain)							
As Fed	3.67	3.73	4.01	4.04	4.60	4.29	3.36
Dry	3.21	3.26	3.22	3.35	4.01	3.82	2.94

* roasted/extruded soybeans

** DE = digestible energy

\+ diet may result in slower growth

| Top of Page |

Sow Diets

Dry sow diets (diets #1-4 in Table 5) are similar to finisher diets in nutrient density. Dry sows can be fed diets that are high in fibre (mixed grain, alfalfa haylage) because they have a greater ability to digest fibre than younger pigs and can consume large amounts of feed. However, do not use high fibre sow diets when the same sow diet is fed to both dry and nursing sows.

Nursing sow diets (diets #1-4 in Table 5) are similar to growing diets in nutrient density. They should contain high levels of digestible energy. Nursing sows should not be fed high fibre diets; physically they may not be able to eat enough feed to meet their greater nutrient demand. Nursing sows should be fed all they can eat during lactation.

TABLE 5. PRACTICAL SOW DIETS								
	DIETS							
	DRY SOW				NURSING SOW			
	1	2	3	4	1	2	3	4
FEED INGREDIENTS (As fed basis)								
GRAINS, kg								
Corn (15% moisture)	800					460	480	
Corn (28% moisture)			554		763			
Barley (Ont.)		894	289			300	834	240
Mixed Grain (Ont.)				891				
SUPPLEMENTS, kg								
Soybean meal (44%)			130		210			
Soybean meal (48%)		80		75			140	
Soybeans (rst/ext)								250
Sow Supplement (36%)	200					240		
Sow premix		26	27	24	27		26	30
TOTAL (kg)	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**	**1000**
CALCULATED ANALYSIS (Dry matter basis)								
Dry Matter (DM), %	87.46	88.74	82.99	86.61	80.80	88.24	89.02	88.23
Energy (DE) MJ/kg	16.75	14.28	15.55	13.57	16.24	15.84	14.50	16.37
Mcal/kg	4.00	3.41	3.71	3.24	3.88	3.78	3.46	3.91
Crude Protein (CP), %	15.96	15.29	15.72	15.15	18.59	17.95	17.83	18.26
Lysine (Lys), %	0.75	0.64	0.69	0.64	0.90	0.87	0.83	0.91

Crude fibre (CF), %	3.01	5.37	4.08	8.21	3.54	3.86	5.26	4.17
Calcium (Ca), %	0.96	0.88	0.96	0.84	1.00	1.17	0.89	1.01
Phosphorus (P), %	.075	0.78	0.77	0.75	0.79	0.87	0.79	0.82
Selenium (Se), Mg/kg	0.19	0.21	0.23	0.21	0.25	0.23	0.21	0.20
Vitamin E, IU/kg	28.06	23.86	26.55	22.61	27.26	33.37	23.84	55.77
Ca:P ratio	1.3:1	1.1:1	1.2:1	1.1:1	1.3:1	1.3:1	1.1:1	1.2:1
FEED INTAKE (kg/sow/day)								
BRED SOWS								
(120 kg) As Fed	1.68	1.94	1.90	2.08				
Dry	1.47	1.72	1.58	1.81				
(140 kg) As Fed	1.81	2.09	2.06	2.26				
Dry	1.58	1.86	1.71	1.95				
(160 kg) As Fed	1.94	2.25	2.21	2.42				
Dry	1.70	1.99	1.83	2.10				
NURSING SOWS								
(145 kg) As Fed					4.63	4.35	4.71	4.20
Dry					3.74	3.84	4.19	3.71
(165 kg) As Fed					5.58	5.25	5.68	5.07
Dry					4.51	4.63	5.06	4.48
(185 kg) As Fed					6.54	6.15	6.66	5.94
Dry					5.28	5.42	5.92	5.24

| Top of Page |

Composition of Premixes and Supplements Used Here

Table 6 lists the major nutrient concentrations of the premixes and supplements used in this Factsheet. For suggested levels of other vitamins and trace minerals not shown here, see OMAFRA Factsheet Order No. 87-076.

The same basic vitamin-mineral premix was used for all the grower-finisher diets,

with extra vitamin E added for those diets using heat processed whole soybeans (Vitamin E is used in fat metabolism) and extra calcium added for diets using large amounts of barley or mixed grain. Extra calcium is needed for these grain diets in order to maintain the Ca:P ratio as barley and mixed grain are higher in phosphorus than corn.

TABLE 6. Composition of Premixes and Supplements Used in this Factsheet (dry matter basis)

PREMIXES AND SUPPLEMENTS	DM %	DE kcal/kg	CP %	LYS %	CF %	Ca %	P %	Se mg/kg	VIT E iu/kg
Starter Premix	96.0	—	—	—	3.1	21.0	10.0	7.8	500
Hog Premix	96.0	—	—	—	3.2	23.0	10.0	5.0	667
Sow Premix	96.0	—	—	—	3.5	28.0	12.5	3.4	850
Starter									
Supplement (37%)	90.0	3720	40.9	3.6	0.93	2.5	1.7	1.1	50
Pig Supplement (38%)	90.0	3755	42.4	3.0	3.6	2.7	1.9	1.1	53
Hog Supplement (42%)	91.3	3705	47.0	3.01	3.1	3.5	2.1	0.6	80
Hog Supplement (40%)	90.4	3444	44.7	2.8	5.7	3.3	1.9	0.6	85
Sow									
Supplement (36%)	90.9	3626	40.1	2.5	3.4	4.6	2.5	0.6	135

| Top of Page |

The sample diets in this Factsheet are only a few examples and are not the only diets that can be fed.

This nutrient list is not complete. Other trace minerals and vitamins are present in these feeds at levels suggested in OMAFRA Factsheet Order No. 87-076.

This Factsheet was reviewed by Janice Murphy, Swine Nutritionist, OMAFRA and originally written by Daphne J. Peer, Swine Specialist, Animal Industry Branch, Ron Ball, Animal & Poultry Science Dept., University of Guelph, Les Young, Animal & Poultry Science Dept., University of Guelph.

| Top of Page |

| Livestock Home Page |

| Central Site | Feedback | Search | Site Map | Français |
| Home | What's New | Calendar | Products | News Releases |

Ontario
This site maintained by the Government of Ontario, Canada

This information is provided as a public service, but we cannot guarantee that the information is current or accurate.
Readers should verify the information before acting on it.

Feedback and technical inquiries to: livestock@omafra.gov.on.ca
© Copyright 2001 Queen's Printer for Ontario